# Montana Board of Oil and Gas Conservation
# Environmental Assessment

**Operator:** Cardinal Oil LLC
**Well Name/Number:** Engelke 1-23-14H
**Location:** SW SW Section 23 T30N R57E
**County:** Roosevelt **, MT; Field (or Wildcat)** Wildcat

## Air Quality

(possible concerns)
Long drilling time: No, 30-40 days drilling time.
Unusually deep drilling (high horsepower rig): Triple derrick drilling rig to drill a single lateral horizontal Bakken Formation test, 19,109'MD/9,257'TVD.
Possible H2S gas production: Yes, slight H2S possible.
In/near Class I air quality area: No Class I air quality area nearby.
Air quality permit for flaring/venting (if productive): Yes, DEQ air quality permit required under 75-2-211.

Mitigation:
X Air quality permit (AQB review)
X Gas plants/pipelines available for sour gas
__ Special equipment/procedures requirements
__ Other:_____
Comments: Existing pipeline for H2S gas in the area._____
_____

## Water Quality

(possible concerns)
Salt/oil based mud: Yes to oil based invert drilling fluids for intermediate casing hole. Horizontal hole will be drilled with saltwater. Surface casing hole, freshwater, and freshwater mud system to be used.
High water table: Slight chance of high water table.
Surface drainage leads to live water: Yes, closest drainage is an unnamed ephermal drainage to a pothole lake about 100' to the northeast from the northeast corner of this location. A stock pond is about 1/8 of a mile to the north from this location. Pothole lake is about ¾ of a mile to the northwest from this location.
Water well contamination: No, closest water wells are about ½ of a mile to the north from this location. All other wells are 1 mile and further from this location. Depth of these wells are 115' to 350'. This well will be drilled with freshwater and freshwater mud to 2,000' and steel surface casing will be run and cemented to surface to protect groundwater.
Porous/permeable soils: Yes, sandy silty soils.
Class I stream drainage: No, Class I stream drainages.

Mitigation:
X Lined reserve pit
X Adequate surface casing
__ Berms/dykes, re-routed drainage
__ Closed mud system
__ Off-site disposal of solids/liquids (in approved facility)
__ Other: _____

Comments: 2,000' surface casing will be drilled with freshwater, steel casing will be run to 2,000' and cemented back to surface. To protect freshwater zones in adjacent water wells. Also, covering Fox Hills aquifer. Adequate surface casing and BOP equipment to prevent problems.

## Soils/Vegetation/Land Use

(possible concerns)
Steam crossings: None anticipated.
High erosion potential: No, location will require a small cut of up to 5.5' and moderate fill of up to 10.7', required.
Loss of soil productivity: No, location to be restored after drilling, if nonproductive. If productive unused portion of this drillsite will be reclaimed.
Unusually large wellsite: No, very large well site 500'X500'.
Damage to improvements: Slight surface use appears to be a CRP field.
Conflict with existing land use/values: Slight

Mitigation
__ Avoid improvements (topographic tolerance)
__ Exception location requested
_X Stockpile topsoil
__ Stream Crossing Permit (other agency review)
_X Reclaim unused part of wellsite if productive
__ Special construction methods to enhance reclamation
_X Other Requires DEQ General Permit for Storm Water Discharge Associated with Construction Activity, under ARM 17.30.1102(28).

Comments: Access will be over county road #17 1011, East South Froid Road and existing farm road. New access road will be built into this location, about 150' off the existing farm road into this location. Oil based invert drilling fluids will be recycled. Completion fluids will hauled to a commercial Class II disposal. Cuttings and solids will be buried/solidified on site in the lined reserve pit. The pit will be allowed to dry and the pit backfilled. No concerns.

**Health Hazards/Noise**

(possible concerns)
Proximity to public facilities/residences: Residences about ½ of a mile to the north and ¼ of a mile to the northwest from this location. The Town of Froid, MT about 10 miles to the west from this location.
Possibility of H2S: Yes, slight.
Size of rig/length of drilling time: Triple drilling rig 30 to 40 days drilling time.

Mitigation:
_X Proper BOP equipment
__ Topographic sound barriers
__ H2S contingency and/or evacuation plan
__ Special equipment/procedures requirements
__ Other:_____

Comments: Adequate surface casing cemented to surface with working BOP stack should mitigate any problems.

**Wildlife/recreation**

(possible concerns)
Proximity to sensitive wildlife areas (DFWP identified): None identified.
Proximity to recreation sites: None identified.
Creation of new access to wildlife habitat: No
Conflict with game range/refuge management: No
Threatened or endangered Species: Species identified as threatened or endangered are the Pallid Sturgeon, Interior Lease Tern, Whooping Crane and Piping Plover. Candidate species is the Sprague's Pipit. NH tracker website indicates species of concern are the Sprague's Pipit, Golden Eagle, Great Blue Heron, Burrowing Owl and Ferruginous Hawk.

Mitigation:
__ Avoidance (topographic tolerance/exception)
__ Other agency review (DFWP, federal agencies, DSL)

__ Screening/fencing of pits, drillsite
__ Other:_____
Comments: Private CRP surface land. No live water nearby. Winter drilling operations anticipated and all birds listed will have migrated out of the area. No concerns.

**Historical/Cultural/Paleontological**

(possible concerns)
Proximity to known sites: None identified.
Mitigation
__ avoidance (topographic tolerance, location exception)
__ other agency review (SHPO, DSL, federal agencies)
__ Other: _____
Comments: Private CRP surface land. No concerns.

**Social/Economic**

(possible concerns)
__ Substantial effect on tax base
__ Create demand for new governmental services
__ Population increase or relocation
Comments: Wildcat well. No concerns

**Remarks or Special Concerns for this site**

An exploratory single lateral horizontal Bakken Formation test, 19,109'MD/9,257'TVD.

**Summary: Evaluation of Impacts and Cumulative effects**

No long term impacts expected, some short term impacts will occur, but can be mitigated.

I conclude that the approval of the subject Notice of Intent to Drill (does/**does not**) constitute a major action of state government significantly affecting the quality of the human environment, and (does/**does not**) require the preparation of an environmental impact statement.

Prepared by (BOGC): /s/Steven Sasaki
(title:) Chief Field Inspector
Date: December 15, 2010

Other Persons Contacted:

Montana Bureau of Mines and Geology, GWIC website
(Name and Agency)
Roosevelt County water wells
(subject discussed)

November 29, 2010_____
(date)

US Fish and Wildlife, Region 6 website
(Name and Agency)
ENDANGERED, THREATENED, PROPOSED AND CANDIDATE SPECIES MONTANA COUNTIES, Roosevelt County, Montana
(subject discussed)
November 29, 2010

Montana Natural Heritage Program Website
(Name and Agency)
Heritage State Rank= S1, S2, S3, T30N R57E
(subject discussed)

_November 29, 2010 _____
(date)

If location was inspected before permit approval:
Inspection date: _December 2, 2010_____
Inspector: __Schmidt_____
Others present during inspection: __None_____